

DØ Upgrade Monthly Progress Report

for the month of August, 2000

Subsystem: Master Schedule and Overview
WBS: All
Date Submitted: 10/3/00
Submitted By: Mike Tuts, Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M1-Solenoid Delivered to Fermilab	5/12/97	5/12/97	0 w
X	M2-Central Preshower Module Fabrication Complete	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	9/30/98	9/30/98	0 w
X	M3-Level Ø-South Installed	5/8/00	2/9/00	12.6 w
X	M2-Muon End Toroids Installed on Platform	8/4/00	11/15/00	-14.2 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	11/1/00	11/22/00	-3 w
	M1-Detector Rolled-in and Hooked Up	2/26/01	2/2/01	3.2 w

Note: The full set of reportable milestones are collected and sorted by date at the end of this report. Also, a separate monthly report for the solenoid project will no longer be included, since that project is now formally complete. The reportable milestones associated with the solenoid project are now included in the above list.

Areas of Concern

Technical

Refer to the WBS level 3 system reports.

Schedule

There has been a minor slip in the rolled-in milestone since last month due to small, detailed changes resulting from schedule updates in some subsystems. Schedule concerns continue to center on the arrival and timely installation of the silicon detector and various readout electronics.

Resources

None

Cost

None

Change Requests

No cost change requests were processed in August.

Progress Summary

In August, the large detector pieces (end muon iron, south end cryostat) were brought together on the detector platform to their final positions. The cabling up of the fiber tracker has started and the preparation of the electronic and cooling infrastructure is underway in anticipation of the arrival of the south silicon detector. The commissioning of the fiber tracker electronics, muon system, the calorimeter electronics, and the online/DAQ system is in progress.

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Subsystem: Silicon Tracker
WBS: 1.1.1
Date Submitted: 9/12/00
Submitted By: Marcel Demarteau, Ron Lipton

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	H Half-Wedge Fabrication 20% Complete	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	10/26/99	10/20/99	0.6 w
X	9 Chip Ladder Fabrication 20% Complete	11/4/99	11/3/99	0.2 w
X	F Wedge Assemblies 20% Complete	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	1/31/00	1/3/00	3.9 w
X	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
X	6 Chip Ladder Fabrication 80% Complete	7/12/00	3/14/00	16.8 w
X	Low Mass Cables Available For Silicon South	7/17/00	NA	0 w
X	9 Chip Ladder Fabrication 80% Complete	7/31/00	3/27/00	17.4 w
X	F Wedge Assemblies 80% Complete	7/31/00	4/26/00	13.2 w
X	Low Mass Cables Available for Silicon North	9/4/00	NA	0 w
X	M2-First Silicon Tracker Barrel/Disk Module Complete	9/14/00	1/24/00	33 w
	South H-Disks Ready to Move to DAB	10/23/00	7/3/00	15.6 w
	South Half-Cylinder Complete and Ready to Move to DAB	10/24/00	8/1/00	12 w
	M3-All Silicon Tracker Barrels/Disks Complete	12/19/00	8/25/00	16 w
	North Half-Cylinder Complete and Ready to Move to DAB	12/19/00	9/18/00	13 w
	M1-Central Silicon Complete	12/19/00	9/18/00	13 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	1/10/01	9/25/00	14.4 w

Areas of Concern

Technical

- There have been further studies of the cross-talk observed in our signals. The main worry is the cross-talk induced on the signal that validates and strobes the data bus lines. A spurious signal on this line causes additional data strobes and can completely invalidate the data readout. The cross-talk is induced in the HDI and low-mass cable system. The adopted solution called for replacing an existing FPGA on the interface card with a faster chip, with more pins. Preliminary tests show that the device does not conform to the manufacturer's (ALTERA) datasheets for the FPGA. Tests are continuing. There is a concern that any change in the design will push the completion of the interface board to an unacceptably late date.
- Due to concerns for failing grounding connections we have moved to using Indium soldering and have retrofitted many built detectors with additional grounding safeguards. All barrels that were completed already have been retrofitted with additional grounding safeguards.
- Substantial effort went into preparing the barrels and disk for insertion into the silicon carbon-fiber support structure. A problem was encountered with the cooling manifold for the silicon detectors and the corresponding connections. The cooling lines from the barrel bulkheads have to make rather sharp turns in order to be guided through the holes in the support structure. Commercial "elbows" for the cooling lines proved inadequate because of the large pressure drops observed and the poor connections that could be made with the cooling lines. This forced us to follow a path of research and development for the appropriate elbows. A lot of time was spent to design an elbow that met our specifications and was safe for multi-year operation in the collision hall.

Schedule

- During the month of August we suffered a significant setback due to the time needed to design and fabricate adequate "elbows" for the cooling lines, as previously discussed. A slippage of at least two weeks was incurred due to this. We believe, however, that we are now very close to a final design of all the components for the cooling system and plan to start assembling the half silicon detector early next month.

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- The exposure to scheduling delays due to lagging part deliveries is diminishing. Delivery of the last sensors from Micron was expected during the month of August. The two-degree stereo sensors were indeed all received by the end of the month. The only remaining sensors are the 90-degree stereo, double-sided double-metal detectors. Only about ten sensors remain and delivery is expected in early September. The last sets of HDIs are now being surface mounted at Promex and Silitronics with only a few HDIs remaining to be done. Nine-chip ladder production, which is the farthest behind schedule, has recently been boosted due to expedient and efficient surface mounting of HDIs at Promex. The production of low-mass cables is proceeding well. Fabrication of the full complement of low-mass cables for the barrels and F-disks is anticipated for early September.
- As mentioned above, a solution has been found for the cross-talk problem in the validation and strobe signal for the data lines. This implied some design changes in the interface card that will delay the delivery of the first pre-production modules that will be used for testing. Because of these problems, the 10% test will be run with earlier versions of the interface cards rather than the final production modules.
- During the month of July there was a power outage at the silicon detector facility that caused nearly two weeks of schedule delay.
- Production of ladders and wedges is proceeding well. We anticipate completion of production at the beginning of October. Four barrels have been completed and only a few mechanical pieces of the end-disk assembly are missing for a complete set of six F-disks that is needed for completion of the first half silicon detector. Fixtures have been built for extracting barrels from the rotating fixture and for barrel-disk mating. The fixture for barrel-disk insertion into the silicon support cylinder also was completed. Trial runs are being exercised of all steps in the assembly of the silicon detectors, and procedures are being written to minimize the risks in detector handling and assembling.

Resources

A number of experienced physicists have left the project to take other positions or to return from visiting positions at Fermilab. We have been able to find some additional personnel and we think that production and assembly will not be affected in a significant way. We are still concerned about the commissioning of the readout system for the silicon detector both at the Silicon facility and at the Assembly Building.

Cost

There is continued cost exposure in the installation, cooling, and final assembly tasks.

Change Requests

None

Progress Summary

- Four barrels, seven F-disks and nearly two H-disks of the DØSMT have been assembled. The assembly of the end F-disk assembly is nearly complete. Combined with the completion of the second H-disk this would complete the first half of the silicon detector. We anticipate that the assembly of components for the second half will benefit from the lessons learned from assembling the first half silicon detector.
- A major delay was incurred due to engineering studies of the cooling lines during the course of the month. An adequate solution has been found and work is proceeding accordingly.
- Ladder and wedge production and testing is proceeding smoothly, with the rate limited by parts availability and capacity of the burn-in testing systems.
- The 10% test continues to be an important system to test and debug electronics and systems and we are well underway to have a fully functioning readout system. The infrastructure to read out a disk with this system has been setup and can receive a complete assembly for full readout. Mechanical work on the half cylinder assemblies is progressing. We expect to start mounting barrel-disk modules in the silicon support structure in September.

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Subsystem: Fiber Tracker and VLPCs
WBS: 1.1.2
Date Submitted: 9/26/00
Submitted By: Bill Freeman for Alan D. Bross

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	<i>Detector</i>			
X	M2 - Assembly Design Complete	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	9/2/99	9/2/99	0 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	11/5/99	11/12/99	-0.9 w
X	M2-Fiber Tracker Assembly Begun	2/1/00	12/6/99	6.2 w
X	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	3/2/00	1/28/00	5 w
X	M3-Fiber Tracker Ribbon Fabrication Complete	5/10/00	3/6/00	9.5 w
X	M3-Fiber Tracker Ribbon Mounting Complete	5/13/00	4/20/00	3.3 w
X	M2-Fiber Tracker Assembly Complete	5/26/00	5/4/00	3.3 w
X	Waveguide Production 50% Complete	7/24/00	1/29/00	24.6 w
	M3-Waveguide Production Complete	10/5/00	6/5/00	17.4 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
X	M3-VLPC Cryo System Operational	8/18/00	6/12/00	9.6 w
X	M3-VLPC Cassette Assembly 50% Complete	9/13/00	4/12/00	21.5 w
	M3-VLPC Cassette Assembly Complete	11/17/00	8/22/00	12.4 w

Areas of Concern

Technical

None

Schedule

None

Resources

None

Cost

None

Change Requests

None

Progress Summary

- CFT waveguide installation continued - approximately 30 are installed.
- CFT waveguide production - essentially complete (296/304 done); ~ 20 to 25 axial and a similar number of stereo waveguides will have to be rebuilt, based on QC checks following production.
- Cassette production - ~ 45 production cassettes are complete.
- The VLPC cryostat system in the platform was cooled down and became operational.

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Subsystem: Forward Preshower
WBS: 1.1.4
Date Submitted: 9/20/00
Submitted By: Abid Patwa

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Forward Preshower Module Fabrication Begun	11/4/98	11/4/98	0 w
X	M3-1st Forward Preshower Detector Complete	2/24/00	1/12/00	6.2 w
X	Module Fabrication and Testing Complete	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	4/3/00	3/8/00	3.6 w

Areas of Concern

Technical
None

Schedule
None

Resources
None

Cost
None

Change Requests
None

Progress Summary

- The four FPS cable winders needed to accommodate clear waveguides were installed with the required supporting unit near each waveguide's cable chute.
- A desktop pulser and control system used to pulse monitoring/calibration LEDs located within the FPS was built at Stony Brook. The system is intended to be used during FPS waveguide hook-up and detector commissioning.
- Cable lengths from the detector to the platform for twisted-pair ribbon cables controlling the LEDs were established. The order to the vendor is expected to be placed early next month.
- Waveguide production continued at Notre Dame and Indiana University with approximately 20% complete.
- A prototype FPS/CPS calibration system ORACLE database was made. Initial testing of the framework is in progress.

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Subsystem: Tracking Electronics
WBS: 1.1.5
Date Submitted: 9/25/00
Submitted By: Marvin Johnson, Fred Borcharding

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	First Readout Crate Installed & Working	11/16/99	12/2/99	-2 w
X	10 Digital Boards Available	7/28/00	3/22/00	18 w
X	Ten 8-chip Analog Boards Available	8/8/00	4/19/00	15.4 w
	Mixer Boards Ready	11/30/00	6/22/00	22.2 w
	Multichip Modules Received	1/30/01	2/23/00	47 w

Areas of Concern

Technical

None

Schedule

The Vicor power supplies for both the analog front-end boards and the interface boards will not arrive until January because of the manufacturer's lead time. We will be forced to use lab supplies for commissioning.

Resources

None

Cost

None

Change Requests

None

Progress Summary

Silicon Electronics

- Interface board testing is nearly done. Production order should go out in early to mid September.
- The adapter cards should be available by the end of September.
- The cable mock-up is complete and we will be ready to install cable as soon as the CFT wave-guides are installed. Cable bundling is complete.
- The interface crate framework is designed and will be installed in the next few weeks.
- Software to readout the entire readout chain is finished, but testing remains to be done.

Fiber Electronics

- Checkout of the 8-MCM analog front-end board is nearly complete. Final version of the artwork will be sent to the vendor by the end of September.
- Checkout of the digital mother and daughter boards is going well with production release expected in mid-September.
- Mixer board layout should finish in September with prototypes available in early November.
- The firmware for CFT Level 1 trigger is nearly complete. The core system is complete, and the remaining work involves auxiliary calculations, diagnostics etc.
- The 12-MCM system has a schematic and partial layout. Work has been suspended until the 8-MCM board is complete.
- Multi-chip module production is scheduled to start at the end of September.

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Subsystem: Calorimeter Electronics
WBS: 1.2.1
Date Submitted: 9/1/00
Submitted By: Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SCA Testing Complete	11/23/99	12/15/99	-2.8 w
X	Shaper Hybrid 50% Complete	2/22/00	5/9/00	-11.1 w
X	M2-Calorimeter Preamp System Test Complete	7/13/00	3/31/00	14.4 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	10/20/00	3/31/00	28.4 w
	Timing System Installed	11/13/00	8/18/00	12 w
	Daughterboard Vendor Production Complete	11/29/00	6/16/00	22.8 w
	BLS Motherboard Assembly Complete	12/12/00	8/7/00	17.6 w
	M2-Calorimeter BLS Assembly Complete	1/8/01	9/26/00	13.6 w

Areas of Concern

Technical

In the course of long-term tests of the preamp power supplies, we have discovered a failure mode in which the water soluble solder flux from improperly cleaned printed circuit boards has deposited a resistive short between pins. This fault apparently occurs when the boards are powered. We are investigating cleaning methods for our assembled boards.

Schedule

The main BLS system printed circuit boards are in production. We have concerns about the board fabrication delivery schedules and we are keeping a close watch on the vendors.

Resources

There is improvement in our manpower situation. Our replacement contract tech is a significant improvement over the previous one. In addition, we are in negotiation with other Lab departments to temporarily obtain the services of available techs. This may alleviate our technician shortage.

Cost

We expect we will require modest use of contingency (\$5k) to mitigate additional safety related issues. Change requests are being prepared.

Change Requests

None

Progress Summary

- We have received the full 1000 pc pre-production order of BLS daughtercards, and the boards are being populated. We expected the boards to be delivered at a rate of 250 per week.
- The pre-production BLS motherboards are in process.
- The BLS controller cards have been re-laid out to address safety concerns. They are presently being populated.
- BLS power supply rework well underway: the new transformers have been installed and wired in; output modules are being tested.
- The preamp power supply control boards in the completed supplies are being removed for cleaning.
- The BLS pORC documentation has undergone a final review, the last committee recommendations are being implemented, and after that we expect to receive clearance.
- Pulser preamp power supplies are under construction.
- The ECS cabling is underway.
- We are starting to implement the necessary HV infrastructure: HV re-cabling, HV pods testing, monitoring and controls.

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Subsystem: Intercryostat Detector
WBS: 1.2.2
Date Submitted: 9/14/00
Submitted By: Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M3-ICD Tile Modules/Boxes Ready	4/19/00	1/18/00	13.2 w
X	M2-ICD Modules Arrive at Fermilab	4/24/00	1/25/00	12.8 w
X	M3-InterCryostat Detectors Installed	5/5/00	2/1/00	13.6 w
	Drawers Ready	10/6/00	12/14/99	40 w

Areas of Concern

Technical

- A new fiber cable prototype is being made at Probit Electronics using black tubing.
- The final routing for fiber cables on the end cryostats still needs to be determined.
- Testing of the motherboards at UTA has revealed the presence of high frequency noise at a level that is significant with respect to the expected signal size – investigation continues.
- MIP calibration of ICD tiles will require individually dismounting each box and performing cosmic-ray tests. This will require close interaction with the FPS group.

Schedule

- We now foresee installation of the first two crate systems in early October. The interaction of this work with tracker/calorimeter cabling is not yet clear.
- Commissioning of the North end will begin in October. Installation of the South end systems will follow in November.

Resources

We will need a limited amount of Fermilab technical support to install the crate/block/backplane assemblies under the cryostats. We will also need support (welder/tech) to install links for the fiber cables on the faces of the ECs.

Cost

None

Change Requests

None

Progress Summary

- One crate/backplane system has been fully assembled at University of Texas-Arlington.
- Fifty-eight electronics drawers have been assembled at Louisiana Tech. Approximately ten remain to be assembled (awaiting PMT sockets).

DØ Upgrade Monthly Progress Report

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Subsystem: Muon Central
WBS: 1.3.2
Date Submitted: 9/18/00
Submitted By: Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	CFA Commissioning Complete	1/4/01	7/10/00	24.3 w
	PDT Commissioning Complete	1/16/01	6/9/00	29.8 w

Areas of Concern

Technical

Slippage in the completion of the gas system is the principal reason for variance in the end date of the PDT commissioning milestone; however, design of the gas system components for the PDTs has now started. In the meantime, we are operating a limited number of PDTs (3 of 94) on bottled gas.

Schedule

Commissioning is underway for all detector components of the central muon upgrade system, but limited in scope due mainly to delays in the final gas system.

Resources

Commissioning manpower was 4.0 FTE's for the month of August. This reduction in the number of people reflects the loss of undergraduate students at the end of the summer. The central muon detector still has no post-docs dedicated to commissioning the hardware.

Cost

None

Change Requests

None

Progress Summary

- Commissioning of the PDT system continued. We uncovered the need to make a minor hardware change to all of the control boards to fix a data transmission problem.
- Considerable effort is being dedicated to finishing the installation of infrastructure, such as cabling, and electronics.

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Subsystem: Muon Forward Trigger Detectors
WBS: 1.3.3
Date Submitted: 9/12/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	10/12/98	10/12/98	0 w
X	All Pixel Octants Assembled	2/23/00	4/4/00	-5.8 w
	All Muon Forward Trigger Detector Planes Installed	12/26/00	8/25/00	16.4 w

Areas of Concern

Technical

None

Schedule

- There is no slack in the installation schedule for forward muon trigger detectors octants. Our efforts are directed toward keeping the installation on schedule.
- *Erratum:* Last month's report erroneously stated that "...design of the A- and B-layer mounting hardware was finished...". It should have read "...design of the A- and C-layer mounting hardware was finished...".

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Modifications of A-layer North octants to accommodate calorimeter piping and cable trays were finished.
- Design of A-layer mover is finished and parts have been procured.
- Design of B-layer mover has started.
- Design of C-layer mounting hardware has finished and parts are procured.
- Assembly of North A-layer plane has started.
- Four VME crates are filled with front-end electronics and installed in the detector.
- Data cable connection of North EF VME crates was finished.
- Software developments for on-line monitoring and control are in progress.

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Subsystem: Muon Forward Tracker
WBS: 1.3.4
Date Submitted: 9/12/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	1/29/99	1/29/99	0 w
X	Arrival Of C-Layer MDT Modules At FNAL	11/3/99	10/22/99	1.7 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	3/30/00	3/10/00	2.8 w
X	B-Layer Octants Assembled	8/24/00	4/18/00	18 w
X	All MDT Octants Assembled	8/24/00	7/14/00	5.8 w
	Muon Forward Tracker B-Layer Planes Installed	11/16/00	6/15/00	21.6 w
	All MDT Planes Installed	11/16/00	8/4/00	14.6 w

Areas of Concern

Technical

None

Schedule

Installation schedule has almost no slack left before detector roll in into collision hall. All our efforts are concentrated on keeping to this schedule.

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Assembly of all MDT octants was finished on August 24. Forty-four out of forty-eight octants have been tested.
- Design and production of mounts for C-layer octants is finished.
- Design of B-layer mounts is finished and production has started.
- Sixteen VME crates for front-end signals processing are filled with electronics and installed in the detector along with thirty-two low-voltage power supplies.
- Cabling of North A-layer octants has finished and preparations for gas system modifications have started.
- H.V. system has been fully commissioned and is ready for operation.
- On-line software developments are in progress.

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Subsystem: Muon Electronics
WBS: 1.3.5
Date Submitted: 9/25/00
Submitted By: Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
X	MDC Fabrication Complete	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	1/31/00	12/13/99	5 w
X	FEB, CB Production Complete	4/10/00	1/3/00	14 w
X	SFE, SRC Fabrication Complete	9/21/00	2/3/00	32.5 w
	MRC, MFC Production Complete	11/6/00	3/27/00	31.4 w

Areas of Concern

Technical
None

Schedule
None

Resources
None

Cost
None

Change Requests
None

Progress Summary

Scintillator front-end board (SFE) production was essentially completed.

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for the month of August, 2000

Subsystem: Trigger
WBS: 1.4.1-1.4.5
Date Submitted: 9/18/00
Submitted By: Gerald C. Blazey and Nikos Varelas

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SLICs Received	12/10/99	11/10/99	4 w
X	M3-Establish Single Crate Internal Data Movement	2/17/00	1/6/00	6 w
	Preproduction MTCxx, MTFB, and MTCM Complete	9/28/00	1/24/00	35 w
	MBTs Received	10/17/00	3/16/00	30 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	10/26/00	4/18/00	26.8 w
	M3- Cal Readout Available to L2	11/1/00	2/11/00	37 w
	M3-L3 Operational (One Full Chain)	11/13/00	6/1/00	23 w
	Global Installation Complete	12/14/00	7/12/00	21.6 w
	L2 Cal Installation Complete	12/14/00	8/21/00	16 w
	L2 CTT Installation Complete	12/14/00	8/9/00	17.6 w
	Alpha Cards Received	12/18/00	5/15/00	30 w
	L2 Muon Installation Complete	1/3/01	7/26/00	21.6 w
	Production MTCxx, MTFB, and MTCM Complete	2/2/01	6/27/00	30 w
	M3-Trigger Level 2 Commissioned	4/25/01	9/21/00	29.6 w

Areas of Concern

Technical

None

Schedule

There are delivery delays for Level 1 CTT/CPS AFE8 components, Level 1MU power supplies, Level 2 Alpha boards, and Level 3 VRC's and segment bridges.

Resources

About 4-5FTE are required for Level 1 tracking firmware, Level 1 technician support, Level 2 integration, Level 3 software, and database development.

Cost

None

Change Requests

None

Progress Summary

Framework

The trigger framework readout to Level 3, serial command link cables, and the master clock timelines were completed.

Level 0/Luminosity Monitor

Coalesced proton and antiproton beams were observed in the Tevatron using the engineering run luminosity monitors. Progress was made on the luminosity monitor TDC board layout and vertex board FPGA design.

Level 1

The production Level 1 Muon MTCM was fabricated and a few boards sent out for assembly. The production designs for the MTCxx and MTM cards were completed and sent out for fabrication pending final review. The preproduction MTC05 card was sent out for fabrication. Nearly all SLDB transmitters have been assembled and received. Design changes for the prototype MCCM were reviewed and approved. The Physics Board was released for fabrication.

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Check plots for the custom backplane were reviewed. Work continued on integrating the Level 1 muon trigger into the DAQ system. The prototype power supply was successfully tested.

The first ten pre-production Level 1CTT/CPS AFE8 boards. Work on the AFE12 layout continued. The fiber optic cable links from the CTT sequencer racks to the VRB racks were installed. The production of the MCMs was delayed by problems with the vendor and their subcontractor for the substrate. Design work on the mixer box continues. The front-end tracking daughter board was delivered. Production of the mother board and transition module is underway. The link testing of the double-wide daughter board was completed, and the firmware testing begun. Purchase of the PCB and components for the CTOC versions of the daughter board was initiated. Testing of the prototype DFE controller board was completed and production begun. The test of the link from the DFE board to the FIC was conducted with limited success. A plan was formulated for commissioning on the platform. LVDS links were delivered. Work proceeded on FPS Level 1 firmware.

Level 2

Coding for the Level 2 Alpha, MBT, and SLIC progressed. Testing of the CIC and SFO cards continued. Recruitment of engineering support for the FIC FPGA code continued. Major progress at the test stand included installation of a full Level 2 rack and of the Level 3 hardware and achievement of Level 1 DFE→FIC→MBT→Alpha data transfer. MCH cable assembly and preparation reached about 50% complete. Global software packages L2gblworker and L2gblem were completed. Design work continued on all parts of the STT system and simulation.

Level 3

The DAB Level 3 system was upgraded to support multiple users and multiple runs. Work continued on hardware test-beds. Design and layout of the core board for Level 3/DAQ was completed.

DØ Upgrade Monthly Progress Report

for the month of August, 2000

Subsystem: Online
WBS: 1.5.1
Date Submitted: 9/25/00
Submitted By: Stuart Fuess

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	Steady DAQ Running	3/17/00	3/31/00	-2 w

Areas of Concern

Technical

None

Schedule

None

Personnel

None

Cost

Performance measurements on existing Host systems are leading to a reevaluation of the planned purchase of the 3rd and final Host system. A system with greater upgrade potential appears to be indicated. We are evaluating whether this system can be acquired within the confines of the existing budget.

Change Requests

None

Progress Summary

Much of the effort of the Online group has gone to support of detector commissioning efforts:

- CFT commissioning – testing of electronics in preparation for wave guide installation
- SMT 10% test stand support – control and monitoring applications, calibration, run control, and data analysis

Internal Online hardware and software development efforts included:

- Beam commissioning – exercise of exchange of information between DØ and accelerator control systems
- Cabling of MCH – continuation of Ethernet and console port cabling in advance of electronic installations
- Channel access archiver – commissioning of application to log, retrieve, and analyze control system information
- Network and disk I/O rate tests – analysis of performance of existing components of DAQ chain

DØ Upgrade Monthly Progress Report

for the month of August, 2000

August '00 Financial Summary

The month of August fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$4,326K on equipment M&S funds. The spending plan shows that spending continues to be slightly lower than plan for FY00. At this stage of the Project, it seemed only crucial to plan for the future, thus the spending plan for October through April was made equal to spending. On the other hand, planned spending from May through September is a best estimate. The Project was allocated an M&S budget of \$3,104K during November. In July, the unobligated AIP balance of \$282.4K was transferred to Upgrade M&S Equipment as budget dollars to be spent this fiscal year. To cover Operating expenditures, the M&S budget was reduced by \$400K early in the fiscal year and an additional \$200K reduction occurred during April. DØ expects to spend the full FY00 budget, which is now \$2,786K. In addition to the Project's DoE funding, forward funding will be instituted to cover expenditures beyond the current fiscal year budget. A \$1,000K forward funding agreement has recently been established with SUNY Stony Brook. Additional forwarded funding support was accepted from Michigan State (\$800K), the University of Notre Dame (\$200K), and Northern Illinois University (\$200K) during August 2000. The remaining DoE funding of \$3,708K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$3,636K, excluding contributions and contingency. Contributions to the Upgrade currently total \$1,442K. These contributions reduce the M&S balance. DØ Upgrade Spokespersons are in the process of negotiating additional contributions of approximately \$385K, but at this time, these funds are still unspecified. A new Cost Estimate is now being used in the determination of Project's estimate to complete (ETC), which remains equal to the Project's M&S balance. The overall cost of the Project has increased. A contingency estimate was developed as a result of a PPD Cost Review, which took place during March. The contingency, which is held by the Directorate, further increases the total Project cost. The total Cost Estimate increased by \$71K during April and an additional \$358K during August as a result of contingency usage requests approved by the Directorate.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$5,676K. These funds represent an obligation on the part of the DØ Upgrade Project and are regularly costed each month via invoices received from these institutions as work is completed. In addition, several institutions have made significant contributions to the DØ Upgrade. A list of the universities and other institutions involved, as well as a more detailed breakdown of the commitments and costs follows.

DØ Upgrade Monthly Progress Report

for the month of August, 2000

FY00 Financial Report as of 8/31/00

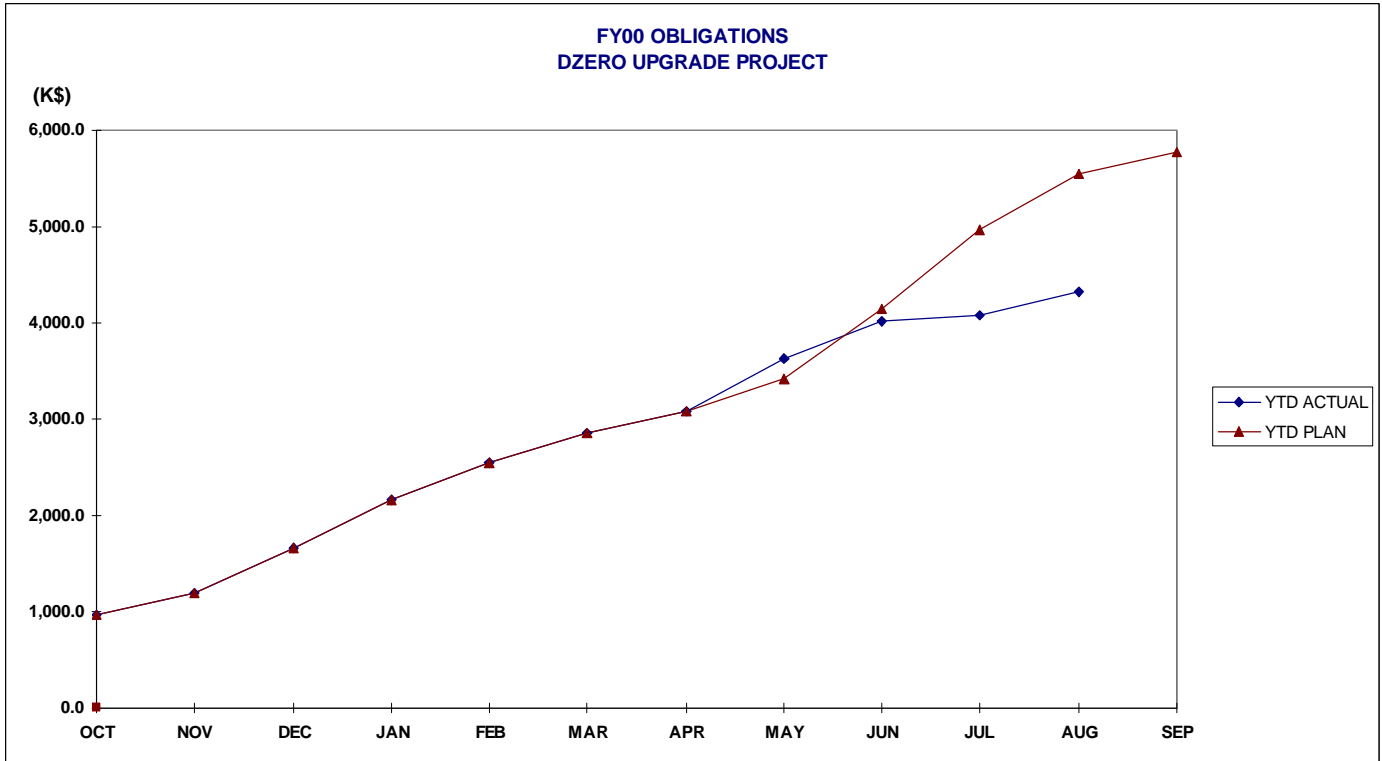
	<u>COST</u> <u>ESTIMATE</u>	<u>PRIOR YR</u> <u>OBLIG</u>	<u>FY 00</u> <u>YTD OBLIG</u>	<u>PROJECT</u> <u>BALANCE</u>
1 <i>TOTAL DZERO UPGRADE PROJECT</i>	41,950.9	33,989.2	4,326.1	3,635.7
1.1 TRACKING DETECTORS	20,382.4	16,773.0	2,928.5	680.9
1.1.1 SILICON TRACKER	8,141.9	6,166.1	1,664.1	311.6
1.1.2 FIBER TRACKER	7,774.3	6,976.3	719.4	78.6
1.1.3 CENTRAL PRESHOWER DETECTOR	238.2	228.2	0.5	9.5
1.1.4 FORWARD PRESHOWER DETECTOR	524.3	500.3	14.6	9.4
1.1.5 TRACKING ELECTRONICS	3,703.7	2,902.1	529.9	271.8
1.2 CALORIMETER	4,656.8	4,163.4	155.5	337.9
1.2.1 FRONT-END ELECTRONICS	4,347.6	3,915.5	94.4	337.7
1.2.2 INTERCRYOSTAT DETECTOR	309.2	247.9	61.2	0.2
1.3 MUON DETECTORS	9,493.1	7,839.9	716.6	936.6
1.3.1 COSMIC RAY SCINTILLATOR	1,223.2	963.2	0.0	260.0
1.3.2 CENTRAL TRIGGER DETECTORS	951.9	713.6	70.9	167.5
1.3.3 FORWARD TRIGGER DETECTOR	2,133.3	1,673.1	89.0	371.2
1.3.4 FORWARD TRACKING DETECTOR	1,410.8	953.8	352.4	104.6
1.3.5 FRONT-END ELECTRONICS	3,773.9	3,536.2	204.4	33.3
1.4 TRIGGER	6,672.6	4,919.5	352.3	1,400.8
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	6.4	5.8
1.4.3 LEVEL 1	1,588.0	1,120.0	234.4	233.6
1.4.4 LEVEL 2	2,039.8	1,002.3	102.2	935.3
1.4.5 LEVEL 3	1,049.0	813.7	9.3	226.0
1.5 ONLINE EQUIPMENT	746.0	293.4	173.2	279.5
1.5.1 ON-LINE EQUIPMENT	746.0	293.4	173.2	279.5
<hr/>				
3.1 <i>TOTAL SOLENOID PROJECT</i>	4,885.6	4,848.2	37.4	0.0
3.1.1 SOLENOID	4,885.6	4,848.2	37.4	0.0

DEFINITION OF TERMS:

Funds:	DØ Upgrade = M&S Equipment Funds; Solenoid = AIP Plant Funds.
Cost Estimate:	Total Project and Sub-Project Budgets without contingency.
Prior Year Obligations:	Obligations for fiscal years '92 through '99 as applicable.
FY 00 Year-to-Date Obligations:	Obligations for fiscal year '00.
Project Balance:	Cost Estimate - (Prior Year Obligations + Fiscal 00 YTD Obligations)
DØ FY 00 Plan:	The M&S funds allocated to the Project/Sub-Projects as extracted from the current schedule.
DØ FY 00 Balance:	DØ FY 00 Plan - FY 00 Year-to-Date Obligations

DØ Upgrade Monthly Progress Report

for the month of August, 2000



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
YTD ACTUAL	962.6	1,199.8	1,664.6	2,169.3	2,546.1	2,855.8	3,077.4	3,623.2	4,009.5	4,073.1	4,326.1	
YTD PLAN	962.6	1,199.8	1,664.6	2,169.3	2,546.1	2,855.8	3,077.4	3,421.4	4,141.4	4,975.4	5,555.4	5,775.4

DØ Upgrade Monthly Progress Report

for the month of August, 2000

Active MOUs as of 8/31/00

<u>INSTITUTION</u>	<u>EQUIPMENT</u>	<u>R&D</u>	<u>COSTED</u>
Boston University	298,200	5,200	82,107
Brookhaven National Laboratory	236,439		181,469
Brown University	820,076	106,000	211,319
California State University, Fresno	26,160		17,452
Columbia University, Nevis Labs	140,000		107,937
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		42,835
Institute for High Energy Physics (IHEP)	270,433		168,313
Kansas State University	113,300	92,512	180,043
Louisiana Tech University	98,856		60,822
Michigan State University	384,238	176,000	83,872
Moscow State University	23,250		18,600
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	133,000	28,000	141,000
SUNY at Stony Brook	1,105,750	20,000	586,755
University of Arizona	790,598	26,600	503,955
University of Calif, Davis		9,720	0
University of IL, Chicago	129,103	22,000	91,042
University of Kansas, Center for Research, Inc.	16,000		3,553
University of Maryland	0		0
University of Nebraska, Lincoln	0		0
University of Notre Dame	68,000	199,500	144,095
University of Oklahoma	43,000		36,896
University of Texas, Arlington	162,886		120,481
<u>University of Washington</u>	<u>60,188</u>	<u>6,200</u>	<u>61,388</u>
 Total Fermilab Funds:	 <u>\$4,984,477</u>	 <u>\$691,732</u>	
 Total Costed:	 2,480,213	 363,720	 <u>\$2,843,933</u>
 Total Open Commitments:	 <u>\$2,504,263</u>	 <u>\$328,012</u>	

DØ Upgrade Monthly Progress Report

for the month of August, 2000

Reportable Milestones Summary

<u>Done</u>	<u>Reportable Milestones</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Solenoid	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPCs	8/31/97	8/31/97	0 w
X	M2-Central Preshower Module Fabrication Complete	Central Preshower	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	Central Preshower	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Forward Trigger	10/12/98	10/12/98	0 w
X	M2-Forward Preshower Module Fabrication Begun	Forward Preshower	11/4/98	11/4/98	0 w
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	Muon Forward Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Tracker	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Tracker	10/26/99	10/20/99	0.6 w
X	Arrival Of C-Layer MDT Modules At FNAL	Muon Forward Tracker	11/3/99	10/22/99	1.7 w
X	9 Chip Ladder Fabrication 20% Complete	Silicon Tracker	11/4/99	11/3/99	0.2 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/5/99	11/12/99	-0.9 w
X	First Readout Crate Installed & Working	Silicon Electronics	11/16/99	12/2/99	-2 w
X	SCA Testing Complete	Calorimeter Electronics	11/23/99	12/15/99	-2.8 w
X	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
X	SLICs Received	Trigger	12/10/99	11/10/99	4 w
X	F Wedge Assemblies 20% Complete	Silicon Tracker	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	Silicon Tracker	1/31/00	1/3/00	3.9 w
X	MDC Fabrication Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Fiber Tracker Assembly Begun	Fiber Tracker	2/1/00	12/6/99	6.2 w
X	M3-Establish Single Crate Internal Data Movement	Trigger	2/17/00	1/6/00	6 w
X	Shaper Hybrid 50% Complete	Calorimeter Electronics	2/22/00	5/9/00	-11 w
X	All Pixel Octants Assembled	Muon Forward Trigger	2/23/00	4/4/00	-5.8 w
X	M3-1st Forward Preshower Detector Complete	Forward Preshower	2/24/00	1/12/00	6.2 w
X	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	3/2/00	1/28/00	5 w
X	Steady DAQ Running	Online	3/17/00	3/31/00	-2 w
X	H Half-Wedge Fabrication 80% Complete	Silicon Tracker	3/29/00	2/23/00	5 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	3/30/00	3/10/00	2.8 w
X	Module Fabrication and Testing Complete	Forward Preshower	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	Forward Preshower	4/3/00	3/8/00	3.6 w
X	FEB, CB Production Complete	Muon Electronics	4/10/00	1/3/00	14 w
X	M3-ICD Tile Modules/Boxes Ready	Intercryostat Detector	4/19/00	1/18/00	13.2 w
X	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	4/24/00	1/25/00	12.8 w
X	M3-InterCryostat Detectors Installed	Intercryostat Detector	5/5/00	2/1/00	13.6 w
X	M3-Level Ø-South Installed	Luminosity Monitor	5/8/00	2/9/00	12.6 w
X	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	5/10/00	3/6/00	9.5 w
X	M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	5/13/00	4/20/00	3.3 w
X	M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/26/00	5/4/00	3.3 w
X	6 Chip Ladder Fabrication 80% Complete	Silicon Tracker	7/12/00	3/14/00	16.8 w
X	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	7/13/00	3/31/00	14.4 w
X	Low Mass Cables Available For Silicon South	Silicon Tracker	7/17/00	NA	0 w
X	Waveguide Production 50% Complete	Fiber Tracker	7/24/00	1/29/00	24.6 w
X	10 Digital Boards Available	Fiber Electronics	7/28/00	3/22/00	18 w
X	9 Chip Ladder Fabrication 80% Complete	Silicon Tracker	7/31/00	3/27/00	17.4 w
X	F Wedge Assemblies 80% Complete	Silicon Tracker	7/31/00	4/26/00	13.2 w
X	M2-Muon End Toroids Installed on Platform	Master	8/4/00	11/15/00	-14.2 w
X	Ten 8-chip Analog Boards Available	Fiber Electronics	8/8/00	4/19/00	15.4 w
X	M3-VLPC Cryo System Operational	VLPCs	8/18/00	6/12/00	9.6 w
X	B-Layer Octants Assembled	Muon Forward Tracker	8/24/00	4/18/00	18 w

DØ Upgrade Monthly Progress Report

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X	All MDT Octants Assembled	Muon Forward Tracker	8/24/00	7/14/00	5.8 w
X	Low Mass Cables Available for Silicon North	Silicon Tracker	9/4/00	NA	0 w
X	M3-VLPC Cassette Assembly 50% Complete	VLPCs	9/13/00	4/12/00	21.5 w
X	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	9/14/00	1/24/00	33 w
X	SFE, SRC Fabrication Complete	Muon Electronics	9/21/00	2/3/00	32.5 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	9/28/00	1/24/00	35 w
	M3-Waveguide Production Complete	Fiber Tracker	10/5/00	6/5/00	17.4 w
	Drawers Ready	Intercryostat Detector	10/6/00	12/14/99	40 w
	MBTs Received	Trigger	10/17/00	3/16/00	30 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	Calorimeter Electronics	10/20/00	3/31/00	28.4 w
	South H-Disks Ready to Move to DAB	Silicon Tracker	10/23/00	7/3/00	15.6 w
	South Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	10/24/00	8/1/00	12 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	10/26/00	4/18/00	26.8 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	Master	11/1/00	11/22/00	-3 w
	M3- Cal Readout Available to L2	Trigger	11/1/00	2/11/00	37 w
	MRC, MFC Production Complete	Muon Electronics	11/6/00	3/27/00	31.4 w
	Timing System Installed	Calorimeter Electronics	11/13/00	8/18/00	12 w
	M3-L3 Operational (One Full Chain)	Trigger	11/13/00	6/1/00	23 w
	Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	11/16/00	6/15/00	21.6 w
	All MDT Planes Installed	Muon Forward Tracker	11/16/00	8/4/00	14.6 w
	M3-VLPC Cassette Assembly Complete	VLPCs	11/17/00	8/22/00	12.4 w
	Daughterboard Vendor Production Complete	Calorimeter Electronics	11/29/00	6/16/00	22.8 w
	Mixer Boards Ready	Fiber Electronics	11/30/00	6/22/00	22.2 w
	BLS Motherboard Assembly Complete	Calorimeter Electronics	12/12/00	8/7/00	17.6 w
	Global Installation Complete	Trigger	12/14/00	7/12/00	21.6 w
	L2 Cal Installation Complete	Trigger	12/14/00	8/21/00	16 w
	L2 CTT Installation Complete	Trigger	12/14/00	8/9/00	17.6 w
	Alpha Cards Received	Trigger	12/18/00	5/15/00	30 w
	M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	12/19/00	8/25/00	16 w
	North Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	12/19/00	9/18/00	13 w
	M1-Central Silicon Complete	Silicon Tracker	12/19/00	9/18/00	13 w
	All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	12/26/00	8/25/00	16.4 w
	L2 Muon Installation Complete	Trigger	1/3/01	7/26/00	21.6 w
	CFA Commissioning Complete	Muon Central	1/4/01	7/10/00	24.3 w
	M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	1/8/01	9/26/00	13.6 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Silicon Tracker	1/10/01	9/25/00	14.4 w
	PDT Commissioning Complete	Muon Central	1/16/01	6/9/00	29.8 w
	Multichip Modules Received	Fiber Electronics	1/30/01	2/23/00	47 w
	Production MTCxx, MTFB, and MTCM Complete	Trigger	2/2/01	6/27/00	30 w
	M1-Detector Rolled-in and Hooked Up	Master	2/26/01	2/2/01	3.2 w
	M3-Trigger Level 2 Commissioned	Trigger	4/25/01	9/21/00	29.6 w